Dragun Corporation

Scientists ▪ Engineers

Summary Report
Soil and Groundwater Sampling
Henkel Surface Technologies Facility
Morenci, Michigan
MID 058 723 867

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Project #1004-05

October 30, 2002

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October 30, 2002

Mr. Brian Freeman
RCRA Enforcement and Compliance Assurance Branch
United States Environmental Protection Agency, Region 5
77 West Jackson Boulevard (DE 9J)
Chicago, Illinois 60604-3590

SUBJECT: Summary Report
Supplemental Investigation to Address USEPA Concerns
Former Morenci Facility
Morenci, Michigan
Project #1004-05

Dear Mr. Freeman:

On behalf of Henkel Surface Technologies (HST), enclosed is a Summary Report documenting certain sampling and testing activities at the HST property located in Morenci, Michigan (the Site). These sampling activities were conducted pursuant to the Work Plan dated July 18, 2002, approved by the United States Environmental Protection Agency (USEPA) Region 5 by letter dated August 21, 2002. The Work Plan was prepared in response to the June 26, 2002, conference call between representatives of the USEPA Region 5 and HST.

The sampling activities were conducted on September 17 and 18, 2002. Mr. Ron Stone of the Michigan Department of Environmental Quality (MDEQ) was present on behalf of the USEPA during the sampling activities. This Summary Report documents the methodologies and results of the sampling activities.

If you have any questions regarding this information, please contact me at (248) 932-0228.

Sincerely,

THE DRAGUN CORPORATION

Jeffrey A. Bolin, M.S., CHMM
Environmental Scientist

Allan Clifford Lawton, M.Sc.
Geologist

JAB/ACL/lrs
Attachment

Cc: Andre Daugavietis, Esq., USEPA (w/partial enclosure including text and figures)
Mr. George Hamper, USEPA (w/partial enclosure including text and figures)
Jack Garavanta, HST (w/enclosures)
Kenneth C. Gold, Esq., HMS&C (w/partial enclosure including text and figures)
Glenn Young, Esq., Henkel Corporation (w/partial enclosure including text and figures)

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INTRODUCTION

On behalf of Henkel Surface Technologies (HST), The Dragun Corporation conducted certain sampling and testing activities at the HST property located in Morenci, Michigan (the Site, see Figure 1). These sampling activities were conducted pursuant to the Work Plan dated July 18, 2002, that was approved by the United States Environmental Protection Agency (USEPA) Region 5 by letter dated August 21, 2002. The Work Plan was prepared in response to the June 26, 2002, conference call between representatives of the USEPA Region 5 and HST.

The sampling activities were conducted on September 17 and 18, 2002. Mr. Ron Stone of the Michigan Department of Environmental Quality (MDEQ) was present on behalf of the USEPA during the sampling activities. This Summary Report documents the methodologies and results of the sampling activities.

SCOPE OF WORK

The sampling included three investigative tasks to evaluate five outstanding concerns of the USEPA at the Site. These tasks include (1) installation of piezometers to evaluate groundwater flow directions and the hydraulic boundary conditions of Bean Creek, (2) sampling the four existing monitoring wells for volatile organic chemicals (VOCs) to evaluate current groundwater quality, and (3) sampling soils along and outside of the west fence line of the Site to evaluate current soil quality. Each of these tasks is discussed in the following text.

Task 1: Evaluation of Groundwater Flow at Bean Creek

The main purpose of this task was to determine whether groundwater discharges from the Site into Bean Creek or whether the groundwater underflows the creek. The Dragun Corporation conducted fieldwork at the Site on September 17 and 18, 2002. The fieldwork included three activities, which are discussed below.

First, The Dragun Corporation advanced a soil boring adjacent to monitoring well MW-3 (Figure 2) through the uppermost aquifer to confirm the thickness of the uppermost aquifer adjacent to Bean Creek and the elevation of the underlying aquitard. The soil boring log for monitoring well MW-3 is unavailable; however, based on the depth of monitoring well MW-3 and on nearby off-site soil boring data, it was expected that the uppermost aquifer extends to less than 25 feet below ground level (fbgl). The new soil boring data are provided in Appendix A.

Second, a piezometer nest consisting of two piezometers (MW-100 and MW-101) was installed adjacent to MW-3 to evaluate the vertical hydraulic gradient at MW-3. Monitoring well MW-

100 was screened near the water table and MW-101 was screened near the base of the water-bearing zone (Table 1). The top-of-casing elevations were surveyed and groundwater elevations in the piezometers were determined (Table 1). Based on regional groundwater flow analysis, it was expected that this location is a regional discharge area and the vertical hydraulic gradient should be upward, that is, the groundwater elevation in the deeper piezometer (MW-101) should be higher than in the shallower piezometer (MW-100).

Third, the groundwater flow direction at the Site was determined using the groundwater elevations determined at monitoring wells MW-1, MW-2, and MW-3 (Table 2 and Figure 2). Then three short-screen drive point piezometers (MW-102, MW-103, and MW-104) were driven into the permeable soils in a line across Bean Creek in the approximate direction of groundwater flow from the Site. These piezometers were installed during a low-flow period when the water in the creek was predominantly due to groundwater discharge and surface runoff was minimal.

These drive-point piezometers were driven to the base of the uppermost aquifer. Based on nearby soil borings, it was expected that the aquifer should extend no more than four to five feet below the streambed. The top-of-casing elevations of the piezometers were surveyed and groundwater elevations in the piezometers and the surface water elevations were determined by measuring the water levels inside and outside the pipe, respectively. Table 1 summarizes the surveying and water elevation data for September 18, 2002. It was expected that (1) the water elevation inside the pipe would be greater than outside, indicating groundwater discharge and (2) the piezometer in the center of the streambed would have a lower groundwater elevation than on the sides, indicating groundwater discharge to the stream from both sides (therefore no underflow).

The field observations indicate there is no underflow of Bean Creek. Conversely, there are no indications that there is underflow of Bean Creek. These are discussed below.

First, the soil data indicate the water-bearing zone near and beneath Bean Creek is thin. For example, adjacent to monitoring well MW-3, the saturated thickness of the water-bearing zone is less than six feet (Appendix A). At MW-102, in the Bean Creek, the sand is less than three feet thick. Figure 3 summarizes the hydrostratigraphic conditions near Bean Creek; these conditions are not conducive to underflow in a regional groundwater flow system.

Second, Table 1 summarizes the groundwater and surface water elevation data for September 18, 2002. The groundwater levels at piezometer nest MW-100/101 and groundwater and surface water levels in Bean Creek at monitoring wells MW-102, MW-103, and MW-104 all indicate upward vertical hydraulic gradients. An upward vertical hydraulic gradient is indicative of a groundwater discharge condition. This condition is characteristic of a regional discharge area and is required to demonstrate that no underflow occurs.

Finally, monitoring wells MW-101, MW-102, MW-103, and MW-104 are screened at the base of the water bearing zone, the latter three in Bean Creek (Figure 3). Table 1 and Figure 3 show that groundwater elevations at MW-101 and MW-104 are higher than the groundwater elevations at

MW-102 and MW-103, which are screened below Bean Creek. This means that groundwater discharges into Bean Creek from both sides of the stream, which in turn means that groundwater cannot underflow Bean Creek.

In summary, in addition to the regional groundwater flow conditions that indicate there would be no underflow of Bean Creek, site-specific data from this investigation indicate that groundwater from the Site cannot underflow Bean Creek. First, the thin water-bearing zone beneath Bean Creek is not conducive to underflow. Second, each of the four locations where vertical hydraulic gradients can be measured indicate an upward vertical hydraulic gradient, which is a prerequisite if there is no underflow. Finally, groundwater elevations are higher on either side of Bean Creek than they are beneath Bean Creek. This means that groundwater from both sides of Bean Creek discharges into Bean Creek, which means there can be no underflow.

Task 2: Collection and Laboratory Testing of Groundwater Samples

To evaluate the current groundwater quality at the Site, The Dragun Corporation sampled groundwater from the four existing monitoring wells (see Figure 2). The sampling was conducted in a manner consistent with previous sampling events. Mr. Stone of the MDEQ collected a split groundwater sample from monitoring well MW-3.

Monitoring Well Sampling: Groundwater samples were collected from the four monitoring wells at the Site. The screen lengths for the four monitoring wells range in length from 10.6 to 23.5 feet. An inflatable packer was installed in each of the wells to limit the well screen exposed to the groundwater to five feet in length. The exposed components of the packer are composed of Buna-N and stainless steel. The packer was inflated using an air pump.

The packer was positioned in each of the monitoring wells with a stainless-steel wire, such that the upper five feet of the saturated well screen was exposed. This is consistent with the limited saturated thickness observed during the installation of the piezometers and discussed in the previous section of this report.

To ensure that representative groundwater samples were collected, temperature, conductivity, Eh, and pH measurements were collected following the removal of each well volume. A groundwater sample was collected following stabilization of field chemistry and removal of at least three well volumes. Field data sheets detailing field chemistry measurements, preservation methods, and sampling observations were prepared for each well sampled (see Appendix B). Additionally, site observations were recorded in a Site dedicated field book.

Each monitoring well was sampled using a positive displacement pump dedicated to each well. Groundwater samples were collected in Series 200, ICHEM laboratory containers (or equivalent) using standard USEPA sampling protocols, chain-of-custody documentation, and sample shipment procedures. Prior to sampling each well, the field chemistry equipment was

decontaminated with a solution of phosphate-free detergent and distilled water, followed by a distilled water rinse.

Decontamination water and purge water were placed on the ground surface adjacent to the soil boring. Additionally, field chemistry equipment was calibrated according to the manufactures' procedures.

Laboratory Testing of Groundwater: Groundwater samples were submitted to KAR Laboratories, Inc. (KAR) of Kalamazoo, Michigan, and tested for the presence of VOCs utilizing USEPA method 8260. One duplicate groundwater sample was collected from one monitoring well (MW-3) and tested for the presence of VOCs utilizing USEPA method 8260. One trip blank was prepared and tested for the presence of VOCs utilizing USEPA method 8260.

Analysis of Laboratory Results – Groundwater: Four groundwater samples were submitted to a laboratory and analyzed for the presence of VOCs. The results of the laboratory testing for VOCs are summarized in Table 3. The laboratory data reports are contained in Appendix C. Review of laboratory data reveals that VOCs were only detected in one (MW-3) of the four groundwater samples. VOCs detected in this groundwater sample include vinyl chloride, 1,1-dichloroethene, cis-1,2-dichloroethene, and trichloroethene. These VOCs were detected in groundwater at concentrations that range from 2.8 micrograms per liter (µg/L) to 50 µg/L.

The Dragun Corporation compared current groundwater data to historic data to evaluate trends in chemical concentrations. This comparison is presented in Table 4. Review of Table 4 reveals that concentrations of the four VOCs detected in groundwater from monitoring well MW-3 during the September 18, 2002 sampling event are consistent with the historic data. This information does not indicate the presence of a significant source of chlorinated VOCs upgradient of monitoring well MW-3.

The Dragun Corporation compared the groundwater laboratory results to Part 201 Generic Cleanup Criteria and Screening Levels (Part 201) for Residential and Commercial I land use as presented in the "Environmental Response Division (ERD) Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables" dated June 7, 2000, (MDEQ, 2000). In addition, since the Property will be used for industrial purposes, the laboratory results were compared to industrial cleanup criteria. The following groundwater exposure pathways were evaluated: (1) Groundwater Contact Exposure, (2) Drinking Water Exposure, (3) Groundwater Quality that May Impact Surface Water Quality (GSI), and (4) Groundwater Contamination Risks from Indoor Air Inhalation Exposure.

Review of groundwater laboratory data reveals that only vinyl chloride was detected in the groundwater at a concentration (19 µg/L) in excess of residential and industrial drinking water criteria (2.0 µg/L and 2.0 µg/L, respectively) and GSI criteria (15 µg/L). Although vinyl chloride is present at a concentration in excess of the drinking water criterion, it is The Dragun Corporation's opinion that this exposure pathway is not relevant. The basis for this opinion is (1) the limited saturated thickness at the Site would not be conducive to yield a sufficient volume of

water for a drinking water well, (2) the saturated thickness is approximately 12 to 17 feet below ground level and health department ordinances restrict the installation of drinking water wells to below 25 feet below ground level, (3) the confirmation of Bean Creek as a hydraulic boundary prevents the migration of the vinyl chloride beyond Bean Creek, and (4) HST is prepared to record a deed restriction on the property deed restricting the use of shallow groundwater.

The concentration of vinyl chloride detected in groundwater at monitoring well MW-3 slightly exceeds the generic GSI criterion of 15 µg/L. Part 201 allows for concentrations of chemicals above generic GSI criteria to vent into surface water, if it is supported by a mixing zone analysis. The Dragun Corporation conducted a mixing zone analysis of the GSI scenario at the Site consistent with the MDEQ Environmental Response Division (ERD) Operational Memorandum #17 dated September 8, 1998 (refer to Appendix D). Based on Site conditions and the mixing zone analysis, the mixing zone dilution factor for the Site at Bean Creek is eight (conservatively estimated using discharge along entire length of Site along Bean Creek). Accordingly, based on the receiving capacity of Bean Creek relative to the groundwater discharge volume, vinyl chloride concentrations eight times that of the generic GSI criterion of 15 µg/L (120 µg/L) could be discharged. Based on this information, it is The Dragun Corporation's opinion that the 19 µg/L concentration of vinyl chloride detected at monitoring well MW-3 does not exceed GSI criteria.

Task 3: Collection and Laboratory Testing of Soil Samples

Based on historic information provided by the MDEQ and HST, the USEPA has expressed concerns relating to potential soil impact in the western portion of the Site and between the western property fence line and Bean Creek. Specifically, the USEPA was concerned with the areas within and adjacent to former waste storage areas numbered 2, 6, and 7.

Soil Sampling: The Dragun Corporation installed 16 soil borings with a stainless-steel hand scoop (HA-1 through HA-16) to depths of approximately one fbgl (refer to Figure 2). Soil samples were field-screened with a photoionization detector (PID) to determine the presence of organic vapors. No PID readings were detected at any of the sample locations.

Soil samples were collected in Series 200, ICHEM laboratory containers (or equivalent) using standard USEPA sampling protocols, chain-of-custody documentation, and sample shipment procedures. Soil samples collected for VOC testing were collected using USEPA Method 5035 (methanol preservation) techniques.

Prior to sampling, the sampling equipment was decontaminated with a solution of phosphate-free detergent and distilled water, followed by a distilled water rinse. Decontamination water was placed on the ground surface adjacent to the soil boring.

Mr. Stone of the MDEQ collected split soil samples from sample locations HA-1, HA-2, HA-3, HA-5, HA-7, HA-10, HA-12, HA-13, and HA-16.

Laboratory Testing of Soil Samples: Soil samples were tested for the presence of VOCs utilizing USEPA Method 8260, polychlorinated biphenyls (PCBs) utilizing USEPA Method 8080, polynuclear aromatic chemicals (PNAs) utilizing USEPA Method 8270, and metals including chromium, copper, lead, and zinc. Chromium samples were tested for total chromium and hexavalent chromium. Soil samples were submitted to KAR laboratory of Kalamazoo, Michigan.

Analysis of Laboratory Results – Soil: Laboratory data reports are presented in Appendix C. The Dragun Corporation compared the soil laboratory results to Part 201 Generic Cleanup Criteria and Screening Levels for Residential and Commercial I land use (MDEQ, 2000). In addition, since the Property will be used for industrial purposes, the laboratory results were compared to industrial cleanup criteria. Six exposure pathways were evaluated: (1) Soil Contamination Risks that May Impact Drinking Water Quality, (2) Soil Contamination Risks to Groundwater Quality that May Impact Surface Water Quality, (3) Soil Contamination Risks to Groundwater Quality that May Pose a Dermal Contact Hazard, (4) Soil Contamination Risks from Indoor Air Inhalation Exposure, (5) Soil Contamination Risks from Ambient Air Inhalation Exposure, and (6) Soil Contamination Risks from Direct Contact Exposure.

The Dragun Corporation's evaluation of the laboratory data is discussed in the following text.

Laboratory Testing of Soil – VOCs: Sixteen soil samples were submitted to a laboratory and analyzed for the presence of VOCs. The results of the laboratory testing for VOCs are summarized in Table 5. The laboratory data reports are contained in Appendix C. Review of Table 5 reveals that only xylenes detected in soil sample HA-5 at a concentration of 710 µg/kg exceeds the GSI cleanup criterion of 700 µg/kg. As previously discussed, The Dragun Corporation conducted a mixing zone analysis of the Site and determined a dilution factor of eight. Accordingly, it is The Dragun Corporation's opinion that the 710 µg/kg concentration of xylenes detected in soil at HA-5 does not exceed GSI criterion.

Laboratory Testing of Soil – PNAs: Sixteen soil samples were submitted to a laboratory and analyzed for the presence of PNAs. The results of the laboratory testing for PNAs are summarized in Table 6. Laboratory data reports are contained in Appendix C. Review of Table 6 reveals that only benzo(a)pyrene and dibenzo(ah)anthracene were detected in soil sample HA-10 at concentrations of 6,100 µg/kg and 2,500 µg/kg, respectively in excess of the residential direct contact cleanup criteria of 2,000 µg/kg. Neither of these PNA concentrations exceeds the industrial direct contact cleanup criterion of 10,000 µg/kg. Since HST is prepared to place a deed restriction on the Site that will limit property use to industrial operations, the concentrations of these PNAs detected in the soil at the Site do not pose an unacceptable risk.

Additionally, fluoranthene and phenanthrene were detected in soil sample HA-10 at concentrations of 17,000 µg/kg and 8,700 µg/kg, respectively, which exceed their respective GSI cleanup criteria of 5,500 µg/kg and 2,300 µg/kg. As previously discussed, The Dragun Corporation conducted a mixing zone analysis of the Site and determined a dilution factor of

eight. Accordingly, it is The Dragun Corporation's opinion that these concentrations of PNAs detected in soil at HA-10 do not exceed GSI criteria.

Laboratory Testing of Soil – Metals: Sixteen soil samples were submitted to a laboratory and analyzed for the presence of chromium (total and hexavalent), copper, lead, and zinc. The results of the laboratory testing for metals are summarized in Table 7. Laboratory data reports are contained in Appendix C.

An analysis of the concentrations of metals detected in soil is presented in the following text.

Total Chromium: Total Chromium was detected in each of the 16 soil samples tested. Concentrations of total chromium detected in soil ranged from 5,600 µg/kg to 231,000 µg/kg. The state default background concentration for total chromium in soil is 18,000 µg/kg.

Because soil samples were tested for both total and hexavalent chromium, it can be seen from these data that the majority of the total chromium is trivalent. Accordingly, total chromium concentrations were evaluated relative to trivalent chromium cleanup criteria. Based on this analysis, none of the concentrations of total chromium detected in soil exceeded any residential or industrial criteria.

Hexavalent Chromium: Hexavalent chromium was detected in four of the 16 soil samples tested. Concentrations of hexavalent chromium detected in soil ranged from 1,450 µg/kg to 4,900 µg/kg.

Review of the soil laboratory data reveals that hexavalent chromium was only detected in soil sample HA-14 at a concentration (4,900 µg/kg) in excess of the GSI cleanup criterion of 3,300 µg/kg. As previously discussed, The Dragun Corporation conducted a mixing zone analysis of the Site and determined a dilution factor of eight. Accordingly, it is The Dragun Corporation's opinion that this concentration of hexavalent chromium detected in soil at HA-14 does not exceed GSI criterion. Additionally, The Dragun Corporation previously conducted leach testing of soil and groundwater sampling in conjunction with MDEQ-approved work plans and demonstrated that metals in soil at the Site do not pose an unacceptable risk to groundwater.

Copper: Copper was detected in 15 of the 16 soil samples tested. Concentrations of copper detected in soil ranged from 5,300 µg/kg to 308,000 µg/kg. The state default background concentration for copper in soil is 32,000 µg/kg.

None of the concentrations of copper detected in soil exceeded any residential or industrial criteria.

Lead: Lead was detected in 14 of the 16 soil samples tested. Concentrations of lead detected in soil ranged from 10,700 µg/kg to 640,000 µg/kg. The state default background concentration for lead in soil is 21,000 µg/kg.

Further review of soil laboratory data reveals that lead was only detected in soil sample HA-1 at a concentration (640,000 µg/kg) in excess of the residential direct contact cleanup criterion of 400,000 µg/kg. This concentration of lead does not exceed the industrial direct contact cleanup criterion for lead in soil of 900,000 µg/kg. Since HST is prepared to place a deed restriction on the Site that will limit property use to industrial operations, the concentration of lead detected in the soil at the Site does not pose an unacceptable risk.

Zinc: Zinc was detected in each of the 16 soil samples tested. Concentrations of zinc detected in soil ranged from 23,900 µg/kg to 2,584,000 µg/kg. The state default background concentration for zinc in soil is 47,000 µg/kg.

Review of the soil laboratory data reveals that zinc was only detected in one soil sample (HA-12) at a concentration (2,584,000 µg/kg) in excess of residential and industrial drinking water criteria (2,400,000 µg/kg and 2,400,000 µg/kg, respectively). As previously discussed, the drinking water pathway at the Site is not applicable.

Laboratory Testing of Soil – PCBs: Sixteen soil samples were submitted to a laboratory and analyzed for the presence of PCBs. The results of the laboratory testing for PCBs are summarized in Table 8. The laboratory data reports are contained in Appendix C. Review of Table 8 reveals that PCBs were not detected in any of the 16 soil samples submitted for testing.

CONCLUSIONS

On behalf of HST, The Dragun Corporation conducted certain sampling and testing activities at the HST property located in Morenci, Michigan. These sampling activities were conducted pursuant to the Work Plan dated July 18, 2002, approved by the USEPA Region 5 by letter dated August 21, 2002. The Work Plan was prepared in response to the June 26, 2002, conference call between representatives of the USEPA Region 5 and HST. The sampling activities were conducted on September 17 and 18, 2002. Mr. Ron Stone of the MDEQ was present on behalf of the USEPA during the sampling activities.

The sampling included three investigative tasks to evaluate five outstanding concerns of the USEPA at the Site. These tasks include (1) installation of piezometers to evaluate groundwater flow directions and the hydraulic boundary conditions of Bean Creek, (2) sampling the four existing monitoring wells for VOCs to evaluate current groundwater quality, and (3) sampling

soils along and outside of the west fence line of the Site to evaluate current soil quality. Based on these investigative tasks, it is The Dragun Corporation's opinion that this information is sufficient to satisfy the USEPA's concerns at this Site.

Evaluation of Groundwater Flow at Bean Creek

Site-specific data from this investigation indicate that groundwater from the Site cannot underflow Bean Creek. First, the thin water-bearing zone beneath Bean Creek is not conducive to underflow. Second, vertical hydraulic gradients indicate an upward vertical hydraulic gradient. Finally, groundwater elevations are higher on either side of Bean Creek, which means that groundwater from both sides of Bean Creek discharges into Bean Creek and there can be no underflow. Accordingly, the downgradient receptor of groundwater from the Site is limited to Bean Creek.

Evaluation of Current Groundwater Quality

Groundwater samples from the four existing monitoring wells were submitted to a laboratory and analyzed for the presence of VOCs. Vinyl chloride, 1,1-dichloroethene, cis-1,2-dichloroethene, and trichloroethene were detected in one monitoring well (MW-3).

The concentrations of the four VOCs detected in groundwater from monitoring well MW-3 during the September 18, 2002, sampling event are consistent with historic data. This information does not indicate the presence of a significant source of chlorinated VOCs upgradient of monitoring well MW-3.

The Dragun Corporation compared the groundwater laboratory results to Part 201 Cleanup Criteria. Vinyl chloride was detected in monitoring well MW-3 at a concentration in excess of the drinking water criterion and the GSI criterion.

Although vinyl chloride is present at a concentration in excess of the drinking water criterion, it is The Dragun Corporation's opinion that this exposure pathway is not relevant. The basis for this opinion is (1) the limited saturated thickness at the Site would not be conducive to yield a sufficient volume of water for a drinking water well, (2) the saturated thickness is approximately 12 to 17 feet below ground level and health department ordinances restrict the installation of drinking water wells to below 25 feet below ground level, (3) the confirmation of Bean Creek as a hydraulic boundary prevents the migration of the vinyl chloride beyond Bean Creek, and (4) HST is prepared to record a deed restriction on the property restricting the use of shallow groundwater.

Although vinyl chloride is present at a concentration in excess of the GSI criterion, Part 201 allows for concentrations of chemicals above generic GSI criteria to vent into surface water if it is supported by a mixing zone analysis. The Dragun Corporation conducted a mixing zone

analysis of the GSI scenario at the Site. Based on the Site conditions and the mixing zone analysis, the mixing zone dilution factor for the Site at Bean Creek is eight (conservatively estimated using discharge along entire length of Site along Bean Creek). Accordingly, based on the receiving capacity of Bean Creek relative to the groundwater discharge volume, vinyl chloride concentrations eight times that of the generic GSI criterion of 15 µg/L (120 µg/L) could be discharged. Based on this information, it is The Dragun Corporation's opinion that the 19 µg/L concentration of vinyl chloride detected at monitoring well MW-3 does not exceed GSI criteria.

Evaluation of Current Soil Quality

Sixteen soil samples were submitted to a laboratory and analyzed for the presence of VOCs, PNAs, metals, and PCBs. The Dragun Corporation compared the soil laboratory results to Part 201 Cleanup Criteria.

Laboratory Testing of Soil – VOCs: Xylenes were detected in soil sample HA-5 at a concentration in excess of the GSI cleanup criterion. Based on the mixing zone analysis of the Site, it is The Dragun Corporation's opinion that the concentration of xylenes detected in soil at HA-5 does not exceed the GSI criterion.

Laboratory Testing of Soil – PNAs: Benzo(a)pyrene and dibenzo(ah)anthracene were detected in soil sample HA-10 at concentrations in excess of the residential direct contact cleanup criteria. Neither of these PNA concentrations exceeds the industrial direct contact cleanup criterion. Since HST is prepared to place a deed restriction on the Site that will limit property use to industrial operations, the concentrations of these PNAs detected in the soil at the Site do not pose an unacceptable risk.
Additionally, fluoranthene and phenanthrene were detected in soil sample HA-10 at concentrations slightly in excess of their respective GSI cleanup criteria. Based on the mixing zone analysis of the Site, it is The Dragun Corporation's opinion that these concentrations of PNAs detected in soil do not exceed GSI criteria.

Laboratory Testing of Soil – Metals: Hexavalent chromium, lead, and zinc were detected in soil at concentrations above the generic residential cleanup criteria.

Hexavalent chromium was detected in soil sample HA-14 at a concentration in excess of the GSI cleanup criterion. Based on the mixing zone analysis of the Site, it is The Dragun Corporation's opinion that this concentration of hexavalent chromium detected in soil at HA-14 does not exceed GSI criterion. Additionally, The Dragun Corporation previously conducted leach testing of soil and groundwater sampling in conjunction with MDEQ-approved work plans and demonstrated that metals in soil at the Site do not pose an unacceptable risk to groundwater.

Lead was detected in soil sample HA-1 at a concentration in excess of the residential direct contact cleanup criterion; however, this concentration of lead does not exceed the industrial

direct contact cleanup criterion. Since HST is prepared to place a deed restriction on the Site that will limit property use to industrial operations, the concentration of lead detected in the soil at the Site does not pose an unacceptable risk.

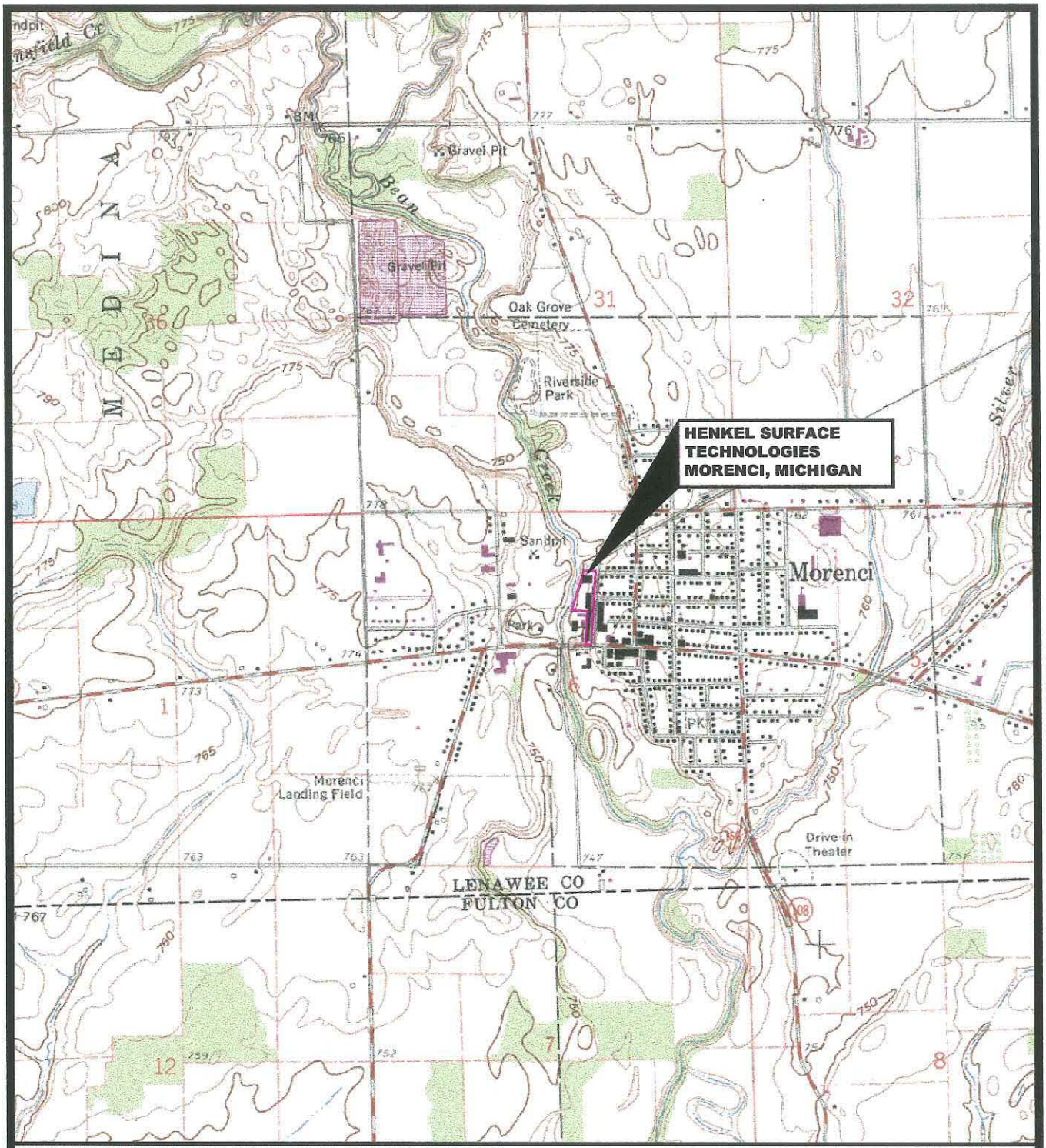
Zinc was detected in soil sample HA-12 at a concentration in excess of residential and industrial drinking water criteria. As previously discussed, the drinking water pathway at the Site is not applicable.

Laboratory Testing of Soil – PCBs: PCBs were not detected in any of the 16 soil samples submitted for testing.

Summary

In summary, based on this information, residual chemical concentrations in soil and groundwater at the Site do not pose an unacceptable risk to human health or the environment based on MDEQ Part 201 cleanup criteria and considering the property use restrictions that HST has proposed and is prepared to implement.

FIGURES



SOURCE: MORENCI, MICHIGAN-OHIO QUADRANGLE (U.S. GEOLOGICAL SURVEY, 1977).

OHIO

QUADRANGLE LOCATION

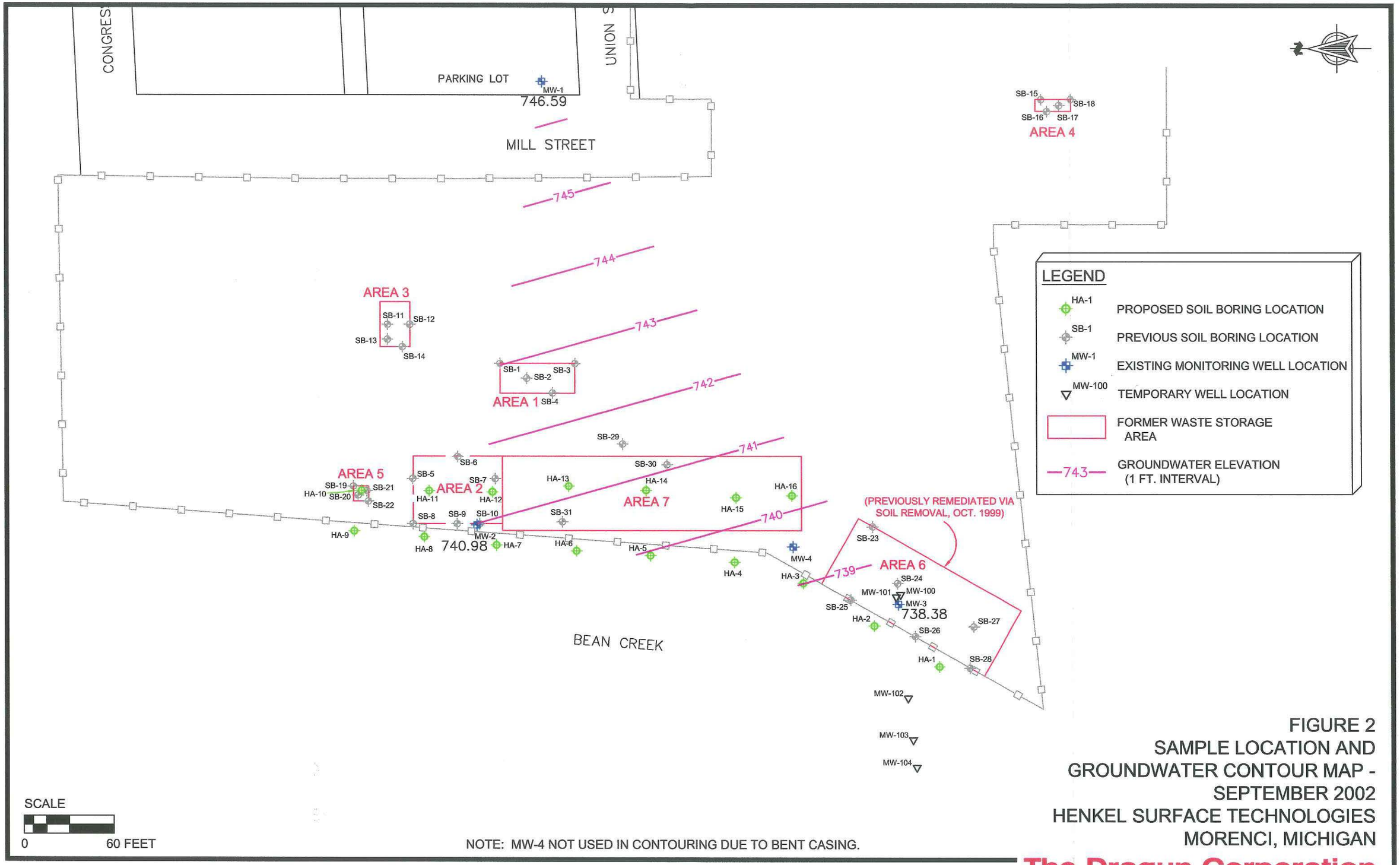
SCALE

0 2000 FEET

FIGURE 1
SITE LOCATION MAP
HENKEL SURFACE TECHNOLOGIES
MORENCI, MICHIGAN

CAD\USGS MORENCI\1004-05 07.18.02

The Dragun Corporation



NOTE: MW-4 NOT USED IN CONTOURING DUE TO BENT CASING.

FIGURE 2
SAMPLE LOCATION AND GROUNDWATER CONTOUR MAP - SEPTEMBER 2002
HENKEL SURFACE TECHNOLOGIES
MORENCI, MICHIGAN

The Dragun Corporation

1004-05\HST Morenci\dwg\10045-02 LDD [GW 0902 NO MW-4] 10.22.02

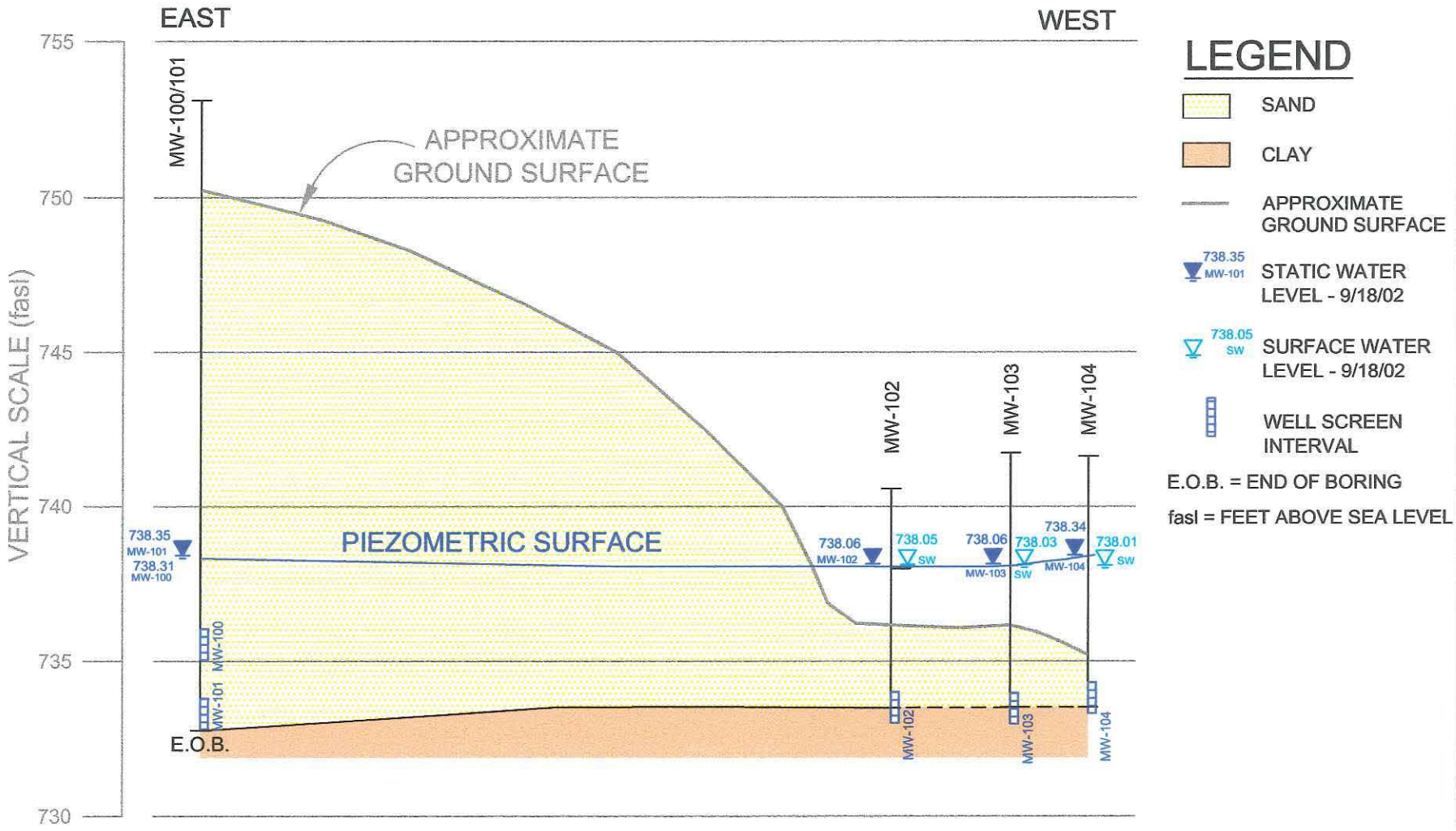


FIGURE 3
HYDROSTRATIGRAPHIC CONDITIONS NEAR BEAN CREEK
HENKEL SURFACE TECHNOLOGIES
MORENCI, MICHIGAN

1004-05/HST MORENCI/10045-03 [FIG 3] 10.22.02

The Dragun Corporation